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A PROPOSED FLORA OF EUROPE

V. H. Heywood (Liverpool) *

A new project to write a Flora of Europe has been under consideration for over a year and already an encouraging measure of support has been received from many quarters. Although many questions remain to be settled it has been decided to make generally known the aims of the committee which has been formed to organize and edit the proposed Flora.

There can be few taxonomists in Europe today who would dispute the need for a general Flora of Europe. Numerous enquiries have revealed that this sentiment is widely shared among other workers in biology and in other branches of science, by botanists, zoologists, geographers and all those whose work is at times directly or indirectly dependent on accurate knowledge concerning the flora of Europe.

This is not surprising when one considers a number of related facts. No other flora in the world has been subjected, in its constituent parts, to such intensive study as that of Europe. Taxonomic and systematic investigations have, in fact, in many countries of Europe proceeded beyond the essentially descriptive phases and have ventured into the fields variously known as experimental taxonomy, genecology, biosystematics and other such disciplines. The level of achievement in the various Floras of the different European countries varies, however, within very wide limits. Some are excellent and fully critical; others are frankly inadequate and do not satisfy the basic requirements of any Flora, that is, precision, accuracy, clarity, intelligibility, ease of reference, correct nomenclature, etc. In between, we find a large number of Floras which vary widely in their aims and in their merits and in their degree of completeness. Completeness is, indeed, another point. Few countries of Europe can boast today a full-scale modern Flora which has been successfully completed. Many impressive works have been launched in the past, destined to remain unfinished — Ascherson & Graebner, *Synopsis der Mitteleuropaischen Flora,* Moss, *The Cambridge British Flora,* Burnat (Briquet), *Flore des Alpes Maritimes,* to name but three examples. It would appear that the days when one or two authors could set out to write a large and detailed national Flora are nearly over: the days of Rouy & Foucaud, Willkomm & Lange, Coste, Arcangeli, have passed. The Floras they wrote were adequate for the needs of the times and were often in the nature of "research Floras" (cf. van Steenis, 1954) (7). The status of taxonomy today and its relationship to the other branches of biology have radically changed and the number of trained taxonomists has not kept pace with the expansion of biological

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science. The keynote in taxonomy today is, perforce, co-operation, and several countries in Europe have in preparation new comprehensive Floras.

Apart from discrepancies in taxonomic merit and completeness, it must be remembered that the majority of European Floras deal with political rather than phytogeographical or natural areas. As Gams (1954) (3) has recently pointed out, we have not yet a complete Flora of the Alps although it is one of the best studied floras in Europe; nor have we a complete Flora of the Pyrenees as a geographical whole **).

Phytogeographical and evolutionary investigations are dependent on accurate summaries of taxonomic knowledge. Those who lecture to advanced students on evolutionary and experimental taxonomy are frequently disturbed when their students come to them afterwards asking for a *taxonomically well-studied* group on which to conduct investigations. The plea now frequently heard is for more good straight taxonomy; and that this plea should come from distinguished experimental workers who have "advanced beyond" pure taxonomy points a moral which has not been fully heeded. In actual fact, a vast amount of taxonomic data, although admittedly not enough, is available about Europe. It is not, however, in an easily accessible form.

Not only phytogeographers and evolutionists, but taxonomists in other continents must feel keenly this lack of a rational presentation of the data concerning the European flora. The disadvantages of this situation for the non-taxonomist are obvious enough, but they have a much wider effect. Any non-taxonomist desirous of obtaining the most elementary data concerning a taxon in Europe as a whole may quickly have to admit defeat when he realises the task in front of him. But the professional taxonomist to whom he turns may frequently find himself in a similar position. What taxonomist would care to give, for example, an account of the distribution of the *Erysimum longifolium-helveticum* complex in Europe without having to admit that a trustworthy answer might take him several weeks or even months to prepare? Again, anyone summarizing the data concerning the subsection *Leucanthemopsis* of *Tanacetum* in Europe by reference only to existing Floras would present a most misleading picture. Such examples could be multiplied at will by any taxonomist. But on a much lesser scale, how can one find out quickly how many species there are of *Aquilegia* or *Diplotaxis* or *Rumex* or *Hypericum*, — or for that matter, any other genus in Europe for which there is no complete modern monograph or revision — without having to consult some fifty to sixty Floras, the *Index Kewensis* Supplements and some dozens of papers. And would the answer make sense? Probably not, for the questioner would find that several of the species are given in the different Floras as subspecies or varieties or even forms (or vice versa). As Darwin has said (1872, p. 37) (2) "few well-marked and well-known varieties can be named which have not been ranked as species by at least some competent judges". In fact, supposing the relevant information has found its way into the Floras, what is the non-professional to make of a taxon which is given in one Flora as a species, in another as a variety, in another as a subspecies, in yet another as a synonym of another taxon? Perhaps he will not even find the genus at all in several of the Floras, unless he is experienced in such matters, because it will be included (at least some of its species) under other genera. It is no use pretending that such situations are exceptional. It is a fact that they are all too common. And as long as taxonomists are satisfied to restrict their work on the European flora to within their national boundaries, and as long as European administrations are content to subsidize the preparation of Floras of their depend-

**) It may, however, be pertinent to mention here that a Flora of the Luso-Iberian Peninsula under the general editorship of Font y Quer (Barcelona) is now in preparation.

encies to the almost complete neglect of European taxonomy, this situation is likely to persist. A preliminary Flora of Europe, such as we suggest in this article, is, we believe, one way of remedying, at least partially, this unfortunate state of affairs.

Nomenclatural inconsistencies of the sort just mentioned will be eliminated in a Flora of Europe. Nomenclature is closely tied up with taxonomy and one of the results of many recent investigations, especially cytogenetic ones, has been to suggest certain taxonomic changes at generic level which will involve changes in nomenclature. These are accepted or applied in different degrees in the various Floras and in subsidiary taxonomic works. In the Flora proposed they would, of course, be applied consistently to whole groups by the very fact of its being a single work. This will be particularly important in such families as the Compositae, Cruciferae, Gramineae, Labiatae, etc. where generic limits are often very fine and the genera are often artificial aggregates of species grouped together for the convenience of taxonomists (cf. Stebbins, 1956) (6). While it will clearly not be possible to eliminate differences of opinion concerning the delimitation of genera, it will be possible in many families to follow one view consistently for all the European species concerned.

It is hardly necessary to point out that the problem of the same taxon occurring in different Floras at specific, subspecific or varietal level will automatically be overcome by having a single volume to consult, not several.

There still remains a further cogent argument for the Flora. As has been noted, taxonomic data are scattered in many journals and papers, often locally published. They are to be found in the most unexpected places — in text books not used or even seen outside the country where written, pharmaceutical reviews, autograph catalogues, luxury flower books, municipal journals, agricultural reports, to name but a few that have come to our notice recently. Then there are the publications of local natural history or other learned societies, and museums, all of which are valid channels for the dissemination of taxonomic facts. They run into hundreds and it can be no secret that even the existence of some of them is unknown to many taxonomists in countries other than those in which they were produced *). All these are in addition to the standard vehicles in which taxonomic matter is to be expected, such periodicals and journals as *Acta Inst. Bot. Komarov, Bull. Mus. Hist. Nat. Paris, Candollea, Kew Bull., Phyton, Bull. Soc. Bot. France, Webbia, Acta Bot. Polon., Bol. Soc. Broter.,* etc. etc. etc. Such a diversity certainly precludes their acquisition by most botanical establishments on economic grounds alone: not even taxonomic institutes can make much pretence at completeness. The situation concerning the receipt of East European publications in the west is notorious and no doubt the reverse is true.

A Flora of Europe would, therefore, be of great value, not only in well equipped botanical libraries, but in other institutions where few, if any, taxonomic works are kept. It will be possible in this way to extend to numerous non-botanical libraries in one Flora the essence of the great amount of taxonomic data which previously could only be obtained from a large number of Floras and journals.

What has been said about periodicals also holds true for Floras. How many libraries possess a complete set of the Floras needed to obtain the basic taxonomic facts concerning taxa throughout their European range? The committee has in preparation a list of what might be considered "standard" Floras for each country,

*) In fact we cannot hope to cover all this ground in the preparation of the Flora of Europe but we hope that the more important of these publications will be brought to our notice, either by the authors themselves or by our collaborators in the different countries of Europe.

that is, the basic list of works which would have to be consulted in order to be able to give a preliminary answer on any problem of European taxonomy. Already it appears that the list will run to nearly 100 titles. Many of these Floras are expensive, several unobtainable or to be found only after considerable delay and expense in the second-hand market. And what is more disturbing, the number of botanical establishments which has a complete set of them is quite small, as far as can be judged. It is probably true to say that there is no single botanical library in the world which possesses all the Floras, monographs, papers, journals, periodicals, etc. needed to compile all the data pertinent to the flora of Europe.

We are very conscious of the magnitude of the task we have set ourselves, and it would be as well at this stage to indicate the public at which the Flora is aimed, although one's intentions in such matters are not always achieved! It will be evident that we are not attempting a European Flora of a monographic nature. Such a Flora would no doubt be highly desirable but its execution would not be practicable and certainly would not be achieved in 15 or even 50 years. Rather we aim to summarize, within a more or less uniform framework, known data concerning the major taxa of Angiosperms and Gymnosperms that grow spontaneously in Europe. The result would be a Flora, with workable keys and adequate descriptions, of broad general usefulness for taxonomists, phytogeographers and biologists in general, both pure and applied.

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A word or two here about the antecedents of the proposed Flora will not be out of place. No adequate Flora of Europe has ever been written. The nearest approaches have been of two sorts — either of the nature of catalogues (e.g. Nyman, *Conspectus Florae Europae*, Richter, *Plantae Europeae*, Gandoger, *Novus Conspectus Florae Europae*, etc.) or regional works which do not include all Europe, such as Hegi's *Illustrierte Flora von Mittel-Europa*, an indispensable opus whose value can scarcely be overestimated.

In the 1940's Rothmaler (then at Berlin and later Vienna) had the stage set for the preparation of an ambitious *Flora Europaea* to be written by about 30 collaborators. This project was to cover not only Europe as far as the Urals but also the Caucasus, Transjordan and parts of North West Africa. During the war in Europe the project had to be abandoned. The problem was brought up again at the 1954 Botanical Congress in Paris where a special session on Progress of Work on the European Flora was held. Valentine (1954) (8) summed up a widespread feeling there in his words "a European Flora, though an immense undertaking, must be regarded as one of the aims of the future; together with the monumental Flora of the URSS, it would enable taxonomists to sum up knowledge over a vast area of the Northern Hemisphere." As a result, a number of botanists, convinced of the necessity for further action, decided to make further investigations as to the practicability of compiling such a Flora. Immediately after the Congress, indeed during its last days, the first enquiries were made, and towards the end of 1955 an informal committee was set up in Britain for this purpose. This held its first meeting in January 1956. This group consisted of Professor N. A. Burges (Liverpool), Professor T. G. Tutin (Leicester), Professor D. H. Valentine (Durham), Professor D. A. Webb (Dublin), and the writer (Liverpool). Later Dr. S. M. Walters (Cambridge) joined the committee. After the general lines of policy were thrashed out it was decided to make some tentative enquiries of colleagues in other countries of Europe. The response was exceptionally encouraging and many helpful suggestions were made. Throughout 1956 the very many problems have been actively considered and a number of meetings of the committee held. The measure of support and goodwill has been such that having decided on the major details and lines of policy, and having

prepared a number of sample pages, the Committee feels that the time is now ripe for a wider publication of the aims and limitations of the proposed Flora; and it is intended to circularize, as far as possible, those workers and institutions in Europe and the world which the Flora might interest. The aim of doing so is twofold — to make the scheme known and to invite opinions and possible collaboration.

It is obvious that anyone looking through the sample pages which we are circulating will at once ask a number of questions. Why, for example, is there so little mention of habitat? Why are the hybrids not always mentioned? Why is there no extra-European geographical distribution? Why are there so few varieties mentioned? We can safely say that whatever opinions the reader might hold on these and similar matters, our own decisions have not been taken lightly. On the contrary, they have been reached after much discussion and much consultation both in this country and elsewhere in Europe. In order, therefore, to forestall some of these criticisms, the motives underlying some of the more important decisions we have taken will be outlined. But firstly it is possible that a word of justification might be felt necessary for the proposed compilation of a Flora of Europe by a committee of British and Irish botanists. The answer here is one of circumstances, partly explained by the nature of the Flora itself.

Although in certain scientific fields schemes of international collaboration have had considerable success, we have felt it best to have the major part of editing and organizing of the Flora undertaken in one country. A fully international organization charged with this work would almost certainly lead to all sorts of technical difficulties and administrative delays, largely due to the spatial isolation of the members. As it is the firm intention of the committee that this Flora should be completed within a maximum of 15 years the need for a closely-knit organization is apparent, an organization which will facilitate frequent consultation, easy collaboration and rapid dissemination of information while still allowing a fair degree of flexibility.

There is in such a type of organization the very real danger of insularity. This will largely be overcome, we hope, by the appointment of regional advisers covering most countries of Europe. As van Steenis (1954) (7) has rightly pointed out, a Flora must "live" in the countries for which it is intended, and this, to a large extent, will depend on the goodwill and co-operation of our collaborators throughout Europe. This will be their Flora as much as ours. Specific ways in which such collaboration might be made effective, for example, by the gift of reprints, are suggested at the end of this article. It is also important to point out that the Flora must on no account be considered as an entirely or even essentially British enterprise. And while it may be sponsored or have the moral support of certain British institutions, this in no sense implies that it represents their policy or aspirations. The Flora will owe no allegiance other than to science.

The amount of time that can be devoted to original research in the compilation of the Flora will necessarily be limited, and one must look far ahead to the possibility of a later more complete edition, but, although the taxonomist in any given country may not find much that is not already known to him concerning his own flora, he will at least be able to see it within its European perspective. Up to the present such an overall view has only been possible in a few genera by means of world-wide or European monographs. There are hundreds of taxa which have never been considered fully in relation to their European congeners. No doubt some of these will be reduced in rank in the Flora once they are seen in perspective, but on the other hand some of them may be elevated in rank. At least taxonomists will not have that nagging feeling that there exist, perhaps, somewhere in Europe

numbers of taxa which have not been 'accounted for', taxa about which there is little if any readily available information, and which might have a bearing on a particular problem in question. An attempt will be made to bring all major taxa out into the open, although we may not always be able to deal with them adequately. The summaries in the Flora of all the major taxa in Europe should greatly simplify the task of most taxonomists in seeking relationships for the groups or species they are working on. It may help our colleagues in other continents to an even greater extent.

Nomenclature will, of course, follow the International Code in its current version as far as possible. It will not be possible to solve all points of nomenclature in the Flora, but we hope to enlist the help of experts on such problems so as to make the nomenclature as accurate as can be reasonably achieved within the limits of the 15 years we have set for the completion of the Flora.

An attempt will be made to use more or less uniform criteria throughout the Flora for the delimitation of taxonomic categories. Complete agreement over the nature and definition of species, subspecies, varieties and forms may never be achieved, but it is probably true to say that over the past decade or two, working taxonomists have reached a broad measure of agreement about the general types of situation to which these categories apply, and a number of working definitions have been proposed which have proved acceptable in their essence to a large number of taxonomists (cf. Rothmaler, 1944, 1954) (4, 5). A statement along these general lines is being prepared by the committee for the use of collaborators, all of whom will be expected to adhere to it in so far as possible.

The Flora will contain all taxa which are considered to merit specific or subspecific rank, but not as a rule those which are considered as varieties unless they are well marked or have some claim to be considered at a higher taxonomic level. Brief notes on the variation of the species may follow after the descriptions and here, as well as in the descriptions themselves, there will be an opportunity to mention those variations to which varietal names may have been attached.

Synonymy in a Flora is always a problem. The taxonomist generally demands it, the non-taxonomist is probably baffled or even annoyed by it. We have decided not to include any in the text proper. All important synonyms, those which are in current use in other Floras in Europe, and those specific synonyms which refer to varieties not mentioned in the text will be included in the index. A method has been devised to refer back from the synonymic index to the current name in the text.

There will inevitably remain a residue of "species" in many genera about which there is not sufficient material or information available on which to base a decision but which appear not to be full species. The inclination in many cases would be to include these taxa at less than specific rank; but in those cases where the appropriate subspecific (or varietal) combinations are not available, the practice of the Flora will be to give them in their original binomial form and in bold face, after the species to which they appear to be most clearly allied. Thus in the sample pages *Digitalis graeca* Ivanina is given in the observations after *D. laevigata*. It is almost certainly not worth specific rank but any change in rank would be premature until more investigations can be made. The point here is that premature nomenclatural changes will be avoided, yet the taxa in question will receive a proper mention and will be indexed as for the numbered species.

Geographical distribution in Europe will be summarized briefly in the text after the description of each species. A full country-by-country presence-or-absence distribution will be indicated for each species in tables at the end of each volume of the Flora (cf. the distribution table given for the species of *Saxifraga* in the sample

pages). Those species which are endemic to Europe, as defined for the purposes of the Flora, will be indicated by a solid circle preceding the geographical summary.

We have decided, rather reluctantly, not to include the extra-European distribution of species. There may be some exceptions as in the case of a species which is known only from one or two localities in Europe but which is widely distributed elsewhere, for example, *Nymphaea lotus* in the sample pages, which in Europe only grows in hot springs in a few places in Hungary but is widely distributed in Egypt and Tropical Africa and Asia. The main reason for this policy is the extreme difficulty of ascertaining accurately the full world distribution of species. This would add very considerably to the labour involved in the compilation of the Flora. The tendency in the past has been to repeat previously published, often inaccurate, summaries of distribution.

Hybrids will be dealt with on their merits. Those which have been recorded only infrequently will not be mentioned — they would be too numerous and their inclusion would add little information of value. When they occur frequently but do not reproduce vegetatively, etc. they will be mentioned and their formula given. A description will be given only when the hybrids are both frequent and reproducing by vegetative or other means.

Aliens will be described only if common or well established over any considerable area.

The problem of the taxonomic treatment of apomicts has not yet been solved and some sort of compromise will have to be sought in the Flora. There is no question of attempting to include all the thousands of apomictic "micro-species" of *Hieracium*, but in some groups a satisfactory summary treatment may be possible.

Chromosome numbers will be given only when there is reasonable certainty as to the accuracy of the counts and only when they are based on material of known wild European origin. Frequently these two requisites are not satisfied and it would be misleading to give the published data in these cases. In *Digitalis*, in the sample pages, counts are given for only a few species. Many more counts have been published (cf. Darlington & Wylie, 1955) (1), but the origin or the taxonomic identity of the material on which the count was made is in dispute.

The problem of delimiting the area to be covered by the Flora has had to be considered, and we have decided to limit it to Europe in the ordinary sense of the word, but with the exclusion of Cyprus and some of the islands in the eastern part of the Aegean Sea, and those parts of the URSS which are covered by Komarov's Flora. The Arctic islands (Spitzbergen, etc.), the Azores, the Canary Islands and Bessarabia will also be excluded. Certain adjacent territories which are phytogeographically related (e.g. N.W. Africa, Turkey) are fortunately being covered by new Floras.

During the preparation of the accounts for the Flora many taxonomic and nomenclatural changes will inevitably be involved. In order to avoid having these valuable data scattered it is intended to publish them in a series of contributions to one of the existing journals. Obviously, when the data form part of a major paper or revision, the authors will be at complete liberty to publish their data in the usual channels, but in these cases a synopsis of the name changes, etc. should be given afterwards. This series of contributions should form a useful adjunct to the Flora and supply some of the more technical information which would be out of place in the Flora proper.

Financing such a large project involves many problems, but negotiations are in progress and it is hoped to receive a substantial contribution to the costs of the

organization. The payment of honoraria to contributors to the Flora is not contemplated.

All workers on the taxonomy or cytotaxonomy of the flora of Europe are earnestly requested to send reprints (preferably two copies) of their papers to the secretary. This will greatly facilitate the work of all concerned and will be a positive contribution to the completeness of the Flora. All reprints will be gratefully acknowledged and the possibility of publishing lists of them annually will be considered.

Progress has been made in the organization of the Flora. The Organizing and Editorial Committee is:

N. A. Burges, Professor of Botany in the University of Liverpool.
V. H. Heywood, Lecturer in Taxonomic Botany in the University of Liverpool.
T. G. Tutin, Professor of Botany at University College, Leicester.
D. H. Valentine, Professor of Botany in the University of Durham.
S. M. Walters, Curator of the Herbarium, University of Cambridge.
D. A. Webb, Professor of Botany in the University of Dublin.

The following have consented to act as Advisory Editors:

Professor T. W. Böcher (Copenhagen), Mr. J. E. Dandy (London),
Professor H. Gaussen (Toulouse), Professor P. Font y Quer (Barcelona),
Dr. K. H. Rechinger (Vienna), Dr. G. Taylor (Kew),
Professor W. Lüdi (Zürich),

and we hope to enlist their help in the appointment of Regional Advisers.

The secretariat is at Liverpool and all correspondence should be addressed to Dr. V. H. Heywood, The Hartley Botanical Laboratories, The University, Liverpool, 3, England.

Summary

A new project to write a Flora of Europe is announced by a committee of British and Irish botanists. Emphasis is laid on the great wealth of taxonomic data concerning the flora of Europe already published. These data are to be found in scores of Floras and in innumerable papers published in very diverse journals and periodicals, many of these works being expensive or difficult to obtain. Attention is drawn to the difficulties experienced by taxonomists, phytogeographers, evolutionists and other biologists in gaining access to this vast body of information and in making sense of it once the requisite facts have been ascertained. The discrepancies in taxonomic merit and completeness between the Floras of the different European countries and the inevitable nomenclatural and technical inconsistencies to be found in them are stressed. The ways in which it is planned to overcome these difficulties in the new Flora are outlined. The Flora will cover Europe in the generally accepted sense of the word and will link up with the area covered by Komarov's *Flora of the URSS*. All the major taxa of Angiosperms and Gymnosperms growing spontaneously in Europe will be keyed and briefly described and the intention is to produce within a period of 15 years a Flora of the greatest possible use to biologists in general, both pure and applied. There is a discussion of the policy which will be adopted concerning the following points: nomenclature, synonymy, taxonomic categories, geographical distribution, hybrids, aliens, apomicts, chromosome numbers. An appeal is made to taxonomists for reprints of their papers. Details of the present organization of the Flora are given.

Résumé

Un comité de botanistes britanniques et irlandais annonce son intention de rédiger une Flore d'Europe. Ils insistent sur la grande richesse des données taxonomiques

déjà publiées sur la flore d'Europe. On trouve ces données disséminées dans une quantité de Flores et d'innombrables articles publiés dans des revues et des périodiques très divers et qui sont, pour la plupart, de prix élevé ou d'accès difficile. Ces botanistes soulignent les difficultés que rencontrent les taxonomistes, phytogéographes, spécialistes de l'évolution et autres biologistes dans leurs efforts de prendre contact avec cette documentation considérable et de l'interpréter après identification des éléments requis. Ils insistent sur les différences de valeur taxonomique des Flores des différents pays d'Europe, leur caractère plus ou moins complet et les variations inévitables de nomenclature ou de technique qu'on y trouve.

Les procédés auxquels on a recours pour surmonter ces difficultés dans la nouvelle Flore sont indiqués dans leurs grandes lignes. Cette Flore embrassera l'Europe dans l'acceptation ordinaire du nom et rejoindra la zone comprise dans la Flore de l'U.R.S.S. de Komarov.

Tous les taxa les plus importants des Angiospermes et des Gymnospermes qui poussent naturellement en Europe y seront indiqués et brièvement décrits, le but des compilateurs est de publier dans un délai de 15 ans une Flore qui soit de la plus grande utilité pour tous les biologistes.

Suit une discussion sur la méthode à adopter pour les points suivants: nomenclature, synonymie, catégories taxonomiques, distribution géographique, hybrides, plantes naturalisées, apomictes, nombre des chromosomes.

Un appel est lancé invitant tous les taxonomistes à envoyer des exemplaires de leurs publications. L'article se termine sur des détails concernant l'organisation actuelle de la Flore.

Zusammenfassung

Ein Komitee britischer und irischer Botaniker kündigt ein neues Projekt zur Veröffentlichung einer Flora Europas an. Der ausserordentliche Reichtum an bereits erschienenen taxonomischen Unterlagen zur Flora Europas wird betont. Diese Unterlagen finden sich in einer Menge von Floren und in zahllosen Abhandlungen in den verschiedensten Zeitschriften. Viele dieser Arbeiten sind teuer und schwer erhältlich. Es wird auf die von Taxonomen, Pflanzengeographen, Genetikern und anderen Biologen festgestellten Schwierigkeiten hingewiesen, Zugang zu diesem weitläufigen Informationsgebiet zu erlangen und es nach Ermittlung der erforderlichen Tatsachen auszuwerten. Die Unterschiede im Wert und in der Vollständigkeit, die zwischen den Floren der verschiedenen Länder Europas bestehen, werden betont und die unvermeidlichen nomenklatorischen und technischen Widersprüche, die sich in ihnen finden, hervorgehoben. Es wird angezeigt, wie diese Schwierigkeiten in der neuen Flora überwunden werden sollen. Die Flora wird den Bereich bearbeiten, den man gewöhnlich unter "Europa" versteht, und dieser wird unmittelbar an das Gebiet anschliessen, das von Komarovs "Flora der U.d.S.S.R." behandelt wurde. Die wichtigsten Taxa der in Europa wildwachsenden Angiospermen und Gymnospermen sollen aufgeschlüsselt und kurz beschrieben werden, und es besteht die Absicht, innerhalb von 15 Jahren eine Flora zu schaffen, die von grösstmöglichem Nutzen sowohl für Vertreter der reinen als auch der angewandten Botanik sein wird. Es wird über das Verfahren diskutiert, das bei folgenden Punkten zu befolgen sein wird: Nomenklatur, Synonymik, taxonomische Kategorien, geographische Zuordnung, Bastardformen, eingeschleppte bzw. eingebürgerte Pflanzen, Apomikte, Chromosomenzahlen. Ein Aufruf ergeht an Taxonomen mit der Bitte um Separata ihrer Abhandlungen. Einzelheiten über die gegenwärtige Organisation der Flora werden mitgeteilt.

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GENETICS AND CYTOLOGY IN RELATION TO TAXONOMY*

Harlan Lewis (Los Angeles)

The relation of genetics to taxonomy scarcely needs comment since all of us are aware that genetic relationship is implicit in our classification of organisms and that the history of genetic relationship is phylogeny. Stated in another way, the theory of evolution provides the orientation for our taxonomy and genetics provides the basis for understanding evolution. Chromosomes derive their prominence as a tool in taxonomy from their direct relation to the genetic system of which they are an integral part. The purpose of this paper will be to consider our present knowledge of genetic systems as they implement our understanding and function as taxonomists.

Genetic relationship came to the fore as a guiding principle in taxonomy when the theory of evolution introduced the concept of hereditary continuity in time, and hence genetic relationship, between species and other taxa derived from a common origin. However, an experimental approach to taxonomy of flowering plants, specifically oriented toward a consideration of the nature of the genetic relationship between races and species, had its beginning as recently as the early 1920's in such work as that of E. B. Babcock on *Crepis*, of Jens Clausen on *Viola*, of G. Turesson on ecotypes, in the demonstration by R. E. Clausen and T. H. Goodspeed of Winge's hypothesis of the alloploid origin of species, and the program in experimental taxonomy begun by Harvey M. Hall and continued by Clausen, Keck, and Hiesey. Through the labors of these and others too numerous to mention we have learned that the evolutionary processes and the resulting products are very diverse. The pattern of this diversity is a function of such variables as population structure, the degree of inbreeding and apomixis, the extent to which chromosome repatterning and quantitative changes occur, the diversity of the habitat, and the consequences of interspecific hybridization. Considering the resulting diversity in patterns of variation, it is perhaps not surprising that with a taxonomically difficult group it may be far easier to determine why the group is difficult than to decide the most appropriate

*) Presented at the symposium "Fifty Years of Plant Taxonomy" arranged by the Systematics Section in celebration of the Golden Jubilee of the Botanical Society of America.

taxonomic disposition. Nevertheless, it is the job of the taxonomist to represent the variation resulting from diverse interacting factors by a simple scheme of classification that will permit identification and at the same time reflect a degree of genetic relationship. We have long since learned that our formal taxonomic categories can not possibly reflect in detail the pattern of genetic diversity. As has often been pointed out, taxa of the same rank are equivalent only by designation and not in degree of genetic affinity. Special categories have been proposed in recognition of the factors responsible for particular variation patterns. Notable among these is that of Camp and Gilly (1943) which, although it did not receive acceptance, did serve the useful purpose of calling attention to some of the heterogeneity of our formalized species.

But despite the diversity of factors interacting to produce a multitude of variation patterns, certain principles are evident as a basis for a sound taxonomy. We recognize that genetic discontinuity resulting from evolutionary processes forms the basis for our classification and, furthermore, that this discontinuity can not be maintained in a given environment in the presence of free gene exchange, except, of course, discontinuity attributable to a simple segregating factor. The maintenance of the genetic integrity of taxa by restriction to gene exchange due to various causes, operating alone or in combination, has been fully discussed by Dobzhansky (1951, and earlier editions) and for plants by Stebbins (1950). Much of the effort of experimental taxonomy has been directed toward demonstrating the presence, absence, or degree of barriers to gene exchange. The value of such a genetic consideration from the standpoint of taxonomy is not that it permits us to define species objectively, which it does not, but rather in the orientation that it provides for our concept of species and taxa of lower rank. Among the vast majority of plants, which are sexually reproducing and normally outcrossing, the taxonomist recognizes as species morphologically delimitable groups separated by demonstrable or reasonably inferred barriers to gene exchange, although these barriers by no means need to be complete. He recognizes as subspecies morphologically delimitable groups between which an appreciable amount of gene exchange occurs or by inference would occur were they to come into contact. In order to preserve a uniformity of formal recognition, entities that are regularly apomictic or self-pollinating are grouped into the most practicable semblance of the more predominant outcrossing sexual organisms.

The view is sometimes expressed that a genetic approach to systematics is of limited practical value because it is applicable to only a relatively few experimentally amenable groups. This would be true if the data obtained concerning genetic differentiation and the basis for its maintenance in one particular group were of value only in considering the taxonomy of that group. But this is not necessarily so. Because of the many laborious and often tedious experiments that have been conducted, we are now in a position to interpret certain kinds of observational data in genetic terms with a high degree of reliability. For example, we have learned that differences in chromosome number and chromosome morphology are generally, if not infallibly, indicative of strong barriers to gene exchange. This permits us to interpret chromosome observations in terms of the genetic systems of which they are an integral part, without conducting an experiment. It is not uncommon to find chromosomal differences indicative of genetic discontinuity while examining the chromosomes of what appeared to be a species showing more or less continuous variation. However, upon learning of the genetic discontinuity indicated by the chromosomes, one then often has no difficulty in finding corresponding discrete morphological discontinuities. *Clarkia similis*, for example, was discovered and confidently described as distinct from *C. epilobioides* from observations made in this sequence (Lewis and Ernst, 1953). One can, of course, find chromosomal differences that would result in hybrid sterility

without finding corresponding phenotypic differences (e.g. *Holocarpha*, Clausen, 1951; *Delphinium*, Lewis and Epling, 1954). Even though chromosomal differences may result in a subsequent independent genetic divergence of the groups concerned, they need not initially be associated with genotypic differences. Highly interfertile geographical races of a species may be genetically far more different and phylogenetically much more distant than morphologically comparable but intersterile populations. As taxonomists it is our job to describe and record genetic relationships as we perceive them and not as we believe they will be in the future. Consequently, we should not attempt to reflect in our formal taxonomy evidence of discontinuity in the genetic system unaccompanied by corresponding genetic differentiation.

The taxonomist can also take advantage of the great number of natural experiments available to him. These have been conducted on a scale far greater than any he could hope to achieve and often involving materials, such as trees or plants with minute flowers, that would be technically difficult to handle. Such natural experiments have been very successfully exploited, for example, by Edgar Anderson (1949, etc.) for non-taxonomic purposes although using methods that can be of great value to the taxonomist in analyzing and interpreting variation. Of particular use to the taxonomist are the numerous instances where one can find closely related taxa growing together. The coexistence of genetically distinct groups of flowering plants within normal pollinating range of one another can be taken as evidence, without experiment, of the presence of effective barriers to gene exchange, unless, of course, the discontinuity is attributable to a simple segregating factor. In fact, this evidence may be of greater significance than that obtainable in the experimental garden. We found in *Delphinium* that modally very distinct taxa are sufficiently interfertile to provide a broad avenue for gene exchange (Epling and Lewis, 1953). If these taxa replaced one another geographically they would fit the general concept of subspecies. But the specific status of these outcrossing taxa is indicated by the fact that they maintain their integrity, despite high interfertility, when growing in mixed colonies. This simple principle that coexistence is evidence of barriers to gene exchange has apparently often been overlooked. For example, one not infrequently finds reference to infraspecific taxa that are said to grow together or "with the species". These are immediately suspect. We have had occasion to look into several such cases and have found them to be of three sorts. The entities may differ by simple segregating factors that scarcely warrant formal taxonomic recognition, they may be comprised of self-pollinating or asexual strains that require special consideration, or frequently they are distinct species which may, however, differ by few or inconspicuous morphological traits. To distinguish between these alternatives requires only careful observation, or at most a simple experiment to determine the breeding habit.

Some patterns of differentiation can only be definitively resolved taxonomically with information derived from experiment and some patterns defy definitive taxonomic resolution even with extensive experiment. Examples of the former would be the frequent instances in which strong reproductive barriers can be demonstrated between morphologically similar and chromosomally indistinguishable taxa that do not grow together. Examples of the latter include the many instances in which taxa can be shown to be genetically highly compatible in the experimental garden but might nevertheless be able to maintain their integrity were they to come into contact under other circumstances, as well as those instances in which a wide spectrum in degree of reproductive barriers is found within a single morphological entity (e.g. *Clarkia deflexa*, Lewis, 1953).

Regardless of the value, as well as the limitations, of a direct experimental approach to taxonomy, and without minimizing the value of hybridization and other experiments as a tool in taxonomy, I would like to emphasize what can be accomplished by a

genetic approach, including the use of chromosome observations, but without culturing, hybridizing, or otherwise experimenting. As an example we might consider a group of five taxa in *Clarkia* (Onagraceae) which are sexually reproducing and normally outcrossed. These can be referred to as *dudleyana*, *brandegeae*, *biloba*, *australis*, and *lingulata*, disregarding taxonomic rank. Each refers to a well defined morphological mode, but when taken together form a continuum in the sequence given, with *dudleyana* and *lingulata* morphologically most different from one another, with *brandegeae* more similar to *dudleyana* and *biloba* than to *australis* or *lingulata*, etc. Vegetatively *dudleyana* and *brandegeae* are indistinguishable but they usually differ by the shape and color pattern of the petals. However, individuals are found that can not be placed definitively in one or the other category on the basis of external morphology alone. In the same way the morphological boundaries between *brandegeae* and *biloba* and between *biloba* and *australis* are also indistinct (Roberts and Lewis, 1955). *Australis* and *lingulata* are indistinguishable in all traits of external morphology except the shape of the petals which are conspicuously notched at the apex in *australis* but entire or essentially so in *lingulata*. In this instance no intermediates are found in the wild. Considering external morphology alone one might consider all of them as components of one polytypic species with *lingulata* as a simple genetic deviant of *australis*. But other considerations alter the picture. *Brandegeae*, *biloba*, *australis*, and *lingulata* replace one another geographically from north to south respectively in the Sierra Nevada foothills of California. *Dudleyana* also occurs in the same foothills where it often grows in mixed colonies with *lingulata*, *australis*, and *biloba*, and hence is specifically distinct from them. But *dudleyana* does not grow within 75 miles of *brandegeae* which it so closely resembles. However, the specific distinctness of these two taxa is indicated by their chromosomes; *dudleyana* has a haploid number of 9 whereas *brandegeae* has 8. *Biloba* and *australis* also have genomes of 8 but not *lingulata* which like *dudleyana* has a genome of 9 chromosomes. Consequently, despite a difference in only one trait in external morphology, the constant difference in chromosome number strongly suggests that *lingulata* is specifically distinct from those taxa with 8 as well as from *dudleyana* with which it grows. We recognize, therefore, three distinct species *C. dudleyana*, *C. lingulata*, and a third, which takes the name *C. biloba*, comprised of three geographical races or subspecies (Lewis and Lewis, 1955).

We have grown these taxa under uniform cultural conditions and have devised experiments in an attempt to determine the nature of ecological differentiation. In addition we have made a number of cross pollinations and have raised the resulting hybrids and their progenies. From this work we found that we were unable to obtain a hybrid between *dudleyana* and any of the others, despite the morphological similarity. We also learned that the hybrid between *lingulata* and each of the three subspecies of *biloba* is highly sterile. In addition we have learned the structural relationship of the chromosomes of these two species and why the hybrid is sterile by observing chromosome behaviour during meiosis (Lewis 1954; Lewis and Roberts 1956). These results have contributed greatly to an understanding of the processes by which this group of plants has become differentiated. From the standpoint of taxonomy, however, these results merely add reinforcement to the conclusions already reached by a genetic interpretation of observations.

Because a direct genetic approach is applicable largely to the relationship between species or their subdivisions, one frequently hears that such a discipline has no significance with respect to higher categories. This is true only in a limited sense. The importance of genetics in relation to the higher categories lies in the orientation it provides. Just, for example, as the concept of organic evolution contributed to taxonomy a way of thinking rather than an objective tool. One should bear in mind

that our taxonomic hierarchy is not a system suspended from the top, but rather one built upon the foundation of the individuals that comprise the populations of a species and the relation of these populations and species to one another. To understand the higher categories one must understand the species of which they are composed.

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A PLEA TO MONOGRAPHERS

Brother Alain (Havana, Cuba)

Since the 7th. International Congress at Stockholm, we have had available an Index Herbariorum including the names of the officials in charge of each Herbarium: furthermore the International Association for Plant Taxonomy is also preparing a list of collectors, and there will be no excuse for ignoring the Herbaria and collectors of any country in the world.

In past years, there have appeared several monographs of groups of plants by specialists, of a family, or a genus, or a group of species in a genus. Time and again, we find that the monographer has not bothered to borrow material from the Herbaria in the countries where the plants involved in his study grow, and he studies only the specimens in the larger Herbaria in his own country or continent. For example, we see that in his study of the Sapindaceae in Pflanzenreich, Radlkofer did not borrow any specimen from American Herbaria, and cites only European Herbaria. Now that it is so easy to send plants by mail, why at least not try to get additional material from the collectors in the different countries? Probably not every letter will be answered, but I think that most of them will be, and the monographer's work will be much more complete and valuable, by the citation of every specimen available. Every Herbarium is interested in getting its own material studied and named, and more so when it is named by a specialist.

I do not think that a European monographer working to-day only on material in European Herbaria of American plants would produce a work of any value, as there is much collecting going on in America to-day, and European Herbaria are not receiving this material as they did during the last century, when there were no Herbaria in America, and all the plants collected were sent to Europe. The same goes, of course, for every country, but this seems to be the best instance for the time being.

It should be also noted that not every European publication reaches all American Herbaria, and vice-versa; some Herbaria are not rich enough to afford subscriptions to all the botanical periodicals in the world. The lack of botanical literature can be avoided by distributing reprints of papers concerning the plants borrowed, at least to the Herbaria that sent their plants to the monographer. This procedure would avoid mistakes and delay in getting the plants named by future collectors. Nowadays, nobody is entitled to think that his own country or Institution has a monopoly of Science, and that outside his own little field of action and investigation, nobody is doing anything. On the contrary, Science, and Botany most of all Sciences, has an international character, and we could say that Botany has no native country nor boundaries. After the last two International Congresses, Botany has been internationalized even more, and we must think of botanists and collectors in every country of the world as our co-workers; if the work of one of them is to be of some use to the others, it must include all the material available, and in the publication of the results, cite all the specimens studied.

There is of course an obligation on the local collectors to reciprocate and send their specimens or duplicates to the monographer as soon as possible after receiving a letter asking for them, to help him in his work.

COMMENTS ON THE TYPIFICATION OF GERARDIA L.

Harold St. John (Honolulu)

John W. Thieret (Taxon 5: 58-59. 1956) has proposed the conservation of 7990 *Stenandrium* Nees (Acanthaceae) as typified by *S. tuberosum* (L.) Urban, and the rejection of 7604 *Gerardia* L. (Scrophulariaceae) as typified by *G. tuberosa* L.

This proposal essentially presents the earlier view of F. W. Pennell who revised many genera of Scrophulariaceae and published many new names and combinations while working under the American Code of Nomenclature. J. E. Smith is listed by Thieret as the first to typify the genus *Gerardia* L., and a phrase quoted from Smith's paragraph is stated to be his choice of a lectotype. Of course the concept of a lectotype was unknown at that time. If Smith's whole passage is read, it is clear that he does not divide *Gerardia* into several different genera, but merely suggests that if it is subsequently divided, the first species, based upon the plant of Plumier, though never seen by Linnaeus, must be the basis of the genus *Gerardia*. Pennell in 1913 and 1930 took the same view, based both upon the historic source of the pre-Linnaean name *Gerardia* and upon the fact that *G. tuberosa* L. was the first listed of the five species. Pennell confirmed that Linnaeus had never seen a holotype of Plumier's *Gerardia* from the West Indies, and that he based his *G. tuberosa* upon Plumier's crude text and figure. Pennell (1930: 19) *) says, "The latter show the narrow round corolla-tube and the corolla-lobes as described by Linné, but it would seem that he unfortunately mistook the anterior for the posterior side of the flower; they fail to show stamens or style, whence Linné probably deduced that these were

*) For full references see Thieret's article in Taxon 5: 58-59. 1956.

hidden within the corolla-tube (although likely his idea of didynamous stamens was an assumption resulting from the misalliance with his other species), while he farther assumed the style to be short; and finally the figures show an ovate seed of a size, that seems to have led Linné to suppose the seeds solitary, whereas they actually occur in pairs, or four to a capsule."

On the other hand, in 1753 Linnaeus had in his herbarium specimens representing his remaining four species, *G. purpurea*, *G. flava*, *G. pedicularia*, and *G. glutinosa*. He studied these specimens himself and named them as listed above. They certainly formed an important part of his concept of this genus *Gerardia*. Of these four species, three, *G. purpurea*, *G. flava*, and *G. pedicularia* are still retained in the genus *Gerardia* by those botanists who estimate the generic limits in the broader sense. The remaining one, *G. glutinosa* from China, is now classed as belonging in another genus of the Scrophulariaceae, and is now called *Adenosma glutinosa* (L.) Merr., being placed in a genus described in 1810 by Robert Brown. Pennell, and Thieret, and probably J. E. Smith, assumed that if Linnaeus adopted an older generic name, the genus must be defined just as that previous author had done. There is nothing in our current rules that requires this. In fact, Linnaeus often took a classic generic name and applied it in a new and partly or wholly different manner. By our rules, modern nomenclature starts with Linnaeus in 1753—54, and thus Linnaeus' choice and application of names, even though based either on principle or whim, is in all instances valid.

Thieret lists the various choices of a lectotype for *Gerardia* L., but when they were different from his own choice he often depreciates them, as "The perennial misapplication of *Gerardia* to a taxon of the Figwort family was given new life by Miss Green who in 1929 . . . in her selection of so-called 'standard-species' to typify certain Linnean genera, arbitrarily chose *Gerardia purpurea*, Linnaeus' second species as the lectotype." On the contrary, when Thieret quotes from an opinion that he agrees with he does it with emphasis on the wisdom of the botanist or the incontrovertibility of his opinion. Again on the same page Thieret says of the choice of *G. tuberosa* as the lectotype of *Gerardia*, "Pennell's conclusions, reached after critical study of Linnaeus' descriptions and of historical evidence, seem incontrovertible. There can be little doubt that the lectotype of *Gerardia* should be *G. tuberosa*." Then he concludes (p. 59), "If the rules of priority are adhered to, the name *Gerardia*, which must be replaced in the Scrophulariaceae by *Agalinis*, would have to replace, in turn, *Stenandrium* of the Acanthaceae. Such a course would involve many nomenclatural transfers in *Stenandrium*, a genus of more than 60 recognized species . . . To avoid these changes it is desirable to conserve the well-known name *Stenandrium* Nees over the so-long-misused *Gerardia* L. for this taxon of tropical American Acanthaceae."

Nothing in the International Code (1956) requires the choice of the lectotype of a taxon from a pre-Linnaean source. In its Appendix IV, pages 294—295, are regulations for the determination of types, and the following apply:

"4. Designation of a *lectotype* . . . Mechanical systems such as the automatic selection of the first species or specimen cited . . . should be avoided as unscientific and productive of possible future confusion and further change." This outlaws the first species technique used by Pennell under the American Code.

"4b. A *lectotype* must be chosen from among elements that were definitely studied by the author up to the time the taxon was published and included in it when it was published . . ."

"4c. Other things being equal, a specimen should be given preference over pre-Linnean or other cited descriptions or illustrations when *lectotypes* of species are designated."

"4d. Whenever the type material of a taxon is heterogeneous the *lectotype* should be selected so as to preserve current usage unless another element agrees better with the original description and (or) figure."

"4e. The first choice of a lectotype should be followed by subsequent workers unless it can be shown that the choice does not fit the original description as well as another of the original elements . . ."

Miss Green's proposal to the British Botanists (1929) was not an unnecessary whim. It was a part of the great project to stabilize nomenclature by typifying all of the genera of Linnaeus and in doing so, when possible, to select a lectotype which would preserve long practice and custom in the application of these generic names. Thieret does not mention that this list in its final form as, "Species lectotypicae generum Linnaei" was printed in the International Rules of Botanical Nomenclature, ed. 3, (1935) as Supplement II. In it on p. 141 the lectotype for our genus is given as *Gerardia purpurea*. This was adopted as a recommendation by vote at a plenary session at the Amsterdam Congress (1935). Nor does he say that Pennell in his last publication (1935: 419) grudgingly accepted this international judgement and adopted *Gerardia* L., T: *G. purpurea* L. as the name for the well known genus of Scrophulariaceae. It should also be mentioned that in cognizance of the history of this genus, the name *Gerardia* L. is still used for the member of the Scrophulariaceae by M. L. Fernald in Gray's Manual of Botany, ed. 8, (1950), and by H. A. Gleason in the New Britton and Brown Illustrated Flora, (1952).

Conclusion: By action of the 1930 and the 1935 International Botanical Congresses, *Gerardia* L. has the lectotype *G. purpurea*. This choice, preserving the customary application of the name, has been widely accepted. The proposal by Thieret to make 7990 *Stenandrium* Nees, T: *S. tuberosum* (L.) Urban a nomen conservandum, and 7604 *Gerardia* L., T: *G. tuberosa* L. a nomen rejiciendum would overturn the present satisfactory situation. As long as the adoption by the 1935 (Amsterdam) International Botanical Congress of *Gerardia purpurea* L. as the standard species or lectotype of *Gerardia* is accepted, the name *Gerardia* will be applicable in its traditional sense to the genus of Scrophulariaceae, and thus it in no way conflicts with *Stenandrium* Nees which remains the first available name for the large genus of Acanthaceae. There is no action needed for the continued use of both these generic names in their long accepted applications. Consequently, Thieret's proposal for the conservation of *Stenandrium* and the rejection of *Gerardia*, T: *G. tuberosa*, is not recommended.

TYPE COLLECTIONS OF ALGAE

Joséphine Th. Koster (Leiden)

Agardh, C. A. (1785-1859) & ——, J. G. (1813-1901)	Lund, Sweden, Bot. Mus. and Herb. (LD)
Allen, G. O. (1883-x)	London, Brit. Mus. (BM) (*Charophyta*)
Allen, T. F. (1837-1902)	New York, Bot. Gard. (NY) (*Charophyta*)
Anderson, C. L.	New York, Bot. Gard. (NY)
Areschoug, J. E. (1811-1887)	Stockholm, Naturhist. Riksmus. (S)
Arnott, G. A. W. (1799-1868)	Antwerp, Natuurwet. Mus. (AWH) (*Diatomeae*); Glasgow, Scotland, Dep. of Bot. (GL); also in herb. Hooker
Bailey, J. W.	Boston, Mass., U.S.A., Soc. Nat. Hist. (BSN)
Baker, S. M. (1887-1917)	Kew, Roy. Bot. Gard. (K)
Batters, E. A. L. (1860-1907)	London, Brit. Mus. (BM); Kew, Roy. Bot. Gard. (K)
Beck von Mannagetta, G. (1856-1931)	Prague, Charles Univ. Bot. Inst. (PRC)
Berkeley, M. J. (1803-1889)	in herb. Hooker
Biddulph, S. (1790-1808)	in herb. Hooker and in herb. Sowerby

Bonnemaison, Th.	Quimper, France, Library of the town.
Börgesen, F. C. E. (1866-1956)	Copenhagen, Bot. Mus. (C)
Bornet, J. B. E. (1828-1911)	Paris, Mus. Nat. Hist. (PC)
Borrer, W.	Kew, Roy. Bot. Gard. (K)
Bory de St.-Vincent, J. B. G. M. (1778-1846)	Paris, Mus. Nat. Hist. (PC); also few in herb. Kützing
Borzi, A. (1852-1921)	Palermo, Italy, Ist. Bot. (PAL)
Braun, A. C. H. (1805-1877)	Berlin-Dahlem (destroyed); a number in herb. Kützing.
Brébisson, L. A. de (1798-1872)	Antwerp, Belgium, Natuurwet. Mus. (AWH); Caen, France, Inst. Bot. (CN); Paris, Mus. Nat. Hist. (PC); also few in herb. Kützing
Bremekamp, C. E. B. (1888-x)	Utrecht, Netherlands, Geological Museum
Brown, R. (1773-1858)	London, Brit. Mus. (BM); also in herb. Dillwyn and in herb. Hooker
Brügger, C. G. (1833-1899)	Chur, Switzerland, Nat. Hist. Mus.
Burchell, W. J. (1781-1863)	Kew, Roy. Bot. Gard. (K)
Carmichael, D. (1772-1827)	Kew, Roy. Bot. Gard. (K)
Chauvin, F. J. (1797-1859)	Caen, France, Inst. Bot. (CN)
Cleve, P. T. (1840-1905)	Stockholm, Naturhist. Riksmus. (S)
Cleve and Möller	Antwerp, Belgium, Natuurwet. Mus. (AWH) (*Diatomeae*)
Collins, F. S. (1848-1920) (also Collins & Howe)	New York, Bot. Gard. (NY)
Cotton, A. D.	Kew, Roy. Bot. Gard. (K)
Cramer, C.	Zürich, Switzerland, Inst. Spez. Bot., E.T.H. (ZT)
Crouan, P. L. (1778-1871) & ——, H. M. (1802-1871)	Concarneau, France, Stat. biol. mar.
Davies, H. (1739?-1821)	London, Brit. Mus. (BM); also in herb. Hooker and in herb. Turner
Dawson, E. Y. (1918-x)	Los Angeles, A. Hancock Found. (AHFH)
Decaisne, J. (1807-1882)	Paris, Mus. Nat. Hist. (PC)
De la Pylaie, B.	Paris, Mus. Nat. Hist. (PC)
De Notaris, G. (1805-1877)	Rome, Ist. Bot. (RO)
Desfontaines, R. (1750-1833)	Paris, Mus. Nat. Hist. (PC)
Desmazières, J. B. H. J. (1796-1862)	Brussels, Jard. Bot. (BR)
De Toni, G. B. (1864-1924)	Padova, Italy, Ist. Bot. (PAD); private collection, Brexia, Carmine 37
Dickie, G. (1812-1882)	London, Brit. Mus. (BM); Linn. Soc. (LINN); Kew, Roy. Bot. Gard. (K)
Dillenius, J. J. (1684-1747)	Oxford, England, Bot. Gard. (OXF)
Dillwyn, L. W. (1778-1855)	London, Linn. Soc. (LINN); Kew, Roy. Bot. Gard. (K); Oxford, England, Dep. of Bot. (OXF)
Donkin, A.	London, Brit. Mus. (BM)
Drège, J. F. (1794-1881)	Kiel, Germany, Bot. Inst.; Uppsala, Sweden, Inst. Syst. Bot. (UPS); Vienna, Nat. Hist. Mus. (W)
Drew-Baker, K. M. (1901-x)	Berkeley, Calif., U.S.A., Dep. of Bot. (UC); Manchester, England, Mus. Univ. (MANCH)
Drouet, Fr. (1907-x)	Chicago, Nat. Hist. Mus. (F)
Dumont d'Urville, J. S. C. (1790-1842)	Caen, France, Inst. Bot. (CN); Paris, Mus. Nat. Hist. (PC)
Eaton, D. C. (1834-1895)	New Haven, Conn., U.S.A., Herb. Yale Univ. (YU)

Ecklon, C. F. (1795-1868)	Frankfurt-am-Main, Germany; Göttingen, Germany, Syst. Inst. (GOET); Kiel, Germany, Bot. Inst.; Leipzig, Germany, Bot. Inst. (LZ); Paris, Mus. Nat. Hist. (PC)
Endlicher, S. (1804-1849)	Vienna, Nat. Hist. Mus. (W)
Esper, E. J. C. (1742-1810)	Erlangen, Germany, Bot. Inst. (ER) (collection incomplete)
Ferguson, W. (1820-1887)	London, Brit. Mus. (BM)
Flahault, C. H. M. (1852-1935)	Montpellier, France, Inst. Bot. (MPU)
Forskål, P. (1736-1763)	Copenhagen, Bot. Mus. (C); London, Brit. Mus. (BM)
Forti, A. (1878-1937)	Padova, Italy, Ist. Bot. (PAD)
Foslie, M. H. (1855-1909)	Trondheim, Norway, Kong. Nor. Vid. Selsk. Bot. Saml. (TRH)
Gardner, N. L. (1864-1937)	Berkeley, Calif., U.S.A., Dep. of Bot. (UC)
Gaudichaud, C. L. (1780-1854)	Paris, Mus. Nat. Hist. (PC); Florence, Italy, Herb. Univ. Fior. (FI)
Geitler, L.	Vienna, Bot. Inst. (WU); Lunz, Austria, Biol. Stat. (LI)
Gepp, E. S. (1864-1922)	London, Brit. Mus. (BM)
Gifford, I. (1823?-1891)	in herb. Griffith
Goodenough, S. (1741-1827)	Kew, Roy. Bot. Gard. (K); Carlisle, England (in part)
Gran, H. H. (1870-x)	Oslo, Bot. Mus. (O)
Gray, Asa (1818-1888)	London, Brit. Mus. (BM) (in part)
Gray, J. E. (1800-1875)	Cambridge, England, Bot. School (CGE); London, Brit. Mus. (BM)
Greville, R. K. (1794-1866)	Edinburgh, Bot. Gard. (E); Glasgow, Scotland, Dep. of Bot. (GL); London, Brit. Mus. (BM) (*Diatomeae*)
Griffiths, A. W. (1768-1858)	London, Brit. Mus. (BM), Linn. Soc. (LINN); Glasgow, Scotland, Dep. of Bot. (GL); Kew, Roy. Bot. Gard. (K); Torquay, England, Nat. Hist. Sci. (TOR)
Grintescu, I.	Cluj, Romania, Inst. Bot. (CL)
Groves, H. (1855-1912) & ——, J. (1858-1933)	London, Brit. Mus. (BM); Kew, Roy. Bot. Gard. (K) (*Charophyta*)
Grunow, A. (1826-1914)	Antwerp, Natuurwet. Mus. (AWH) (*Diatomeae*); Vienna, Mus. Nat. Hist. (W); Hamburg, Germany, Bot. Gart. (HBG)
Hallas, E. (1849-1926)	Copenhagen, Bot. Mus. (C)
Hansgirg, A. (1846-1917)	Vienna, Mus. Nat. Hist. (W)
Harvey, W. H. (1811-1866)	Dublin, Dep. of Bot. Trinity Coll. (TCD), Kew, Roy. Bot. Gard. (K); London, Brit. Mus. (BM)
Hassall, A. H. (1817-1894)	London, Brit. Mus. (BM)
Hauck, F. (1849-1889)	Leiden, Netherlands, Rijksherb. (L)
Hazen, T. E. (1874-x)	Nashville, Tenn., U.S.A., Van der Bilt Univ. (VDB)
Heurck, H. van (1839-1909)	Antwerp, Belgium, Natuurwet. Mus. (AWH) (*Diatomeae*)
Heydrich, F.	Berlin-Dahlem (destroyed)
Hooker, W. J. (1785-1865) & ——, J. D. (1817-1911)	Kew, Roy. Bot. Gard. (K)
Holmes, E. M. (1843-1930)	Birmingham, England, Dep. of Bot. (BIRM)
Howe, M. A. (1867-1936)	New York, Bot. Gard. (NY)
Hoyt, W. D.	Washington, Nat. Herb. (US); Lexington, Va., U.S.A., Washington & Lee Univ.

Hudson, W. (1730-1793)	London, Brit. Mus. (BM) (some, mostly burnt)
Huitfeldt-Kaas, V. W. H.	Oslo, Bot. Mus. (O)
Hussey, J. L. (1862-1899)	Adelaide, Australia, Bot. Dep. (ADU); London, Brit. Mus. (BM); Kew, Roy. Bot. Gard. (K)
Hygen, G. (1908-x)	Oslo, Bot. Mus. (O)
Jacobsen, J. P. (1847-1885)	Copenhagen, Bot. Mus. (C) (*Desmidiaceae*)
Jorde, I.	Oslo, Bot. Mus. (O)
Karsten, G. (1863-1937)	Leiden, Netherlands, Rijksherb. (L) (*Chroolepideae*)
Kickx, J. (1803-1863)	Namur, Belgium, Univ. (NAM)
Kjellmann, F. R. (1846-1907)	Uppsala, Sweden, Inst. Syst. Bot. (UPS)
Koster, J. Th. (1902-x)	Leiden, Netherlands, Rijksherb. (L)
Kützing, F. T. (1807-1893)	Antwerp, Belgium, Natuurwet. Mus. (AWH) (*Diatomeae*); Leiden, Netherlands, Rijksherb. (L)
Kylin, J. H. (1879-1949)	Lund, Sweden, Bot. Mus. and Herb. (LD); Uppsala, Sweden, Bot. Mus. (UPS)
Labillardière, J. J. H. de (1755-1834)	Paris, Mus. Nat. Hist. (PC)
Lagerheim, N. G. (1860-?)	Quito, Ecuador, Univ. (Q)
Laing, R. M.	Christchurch, New Zealand, Canterbury Mus. (CANTY)
Lamarck, J. B. A. P. M. de (1744-1829)	Paris, Mus. Nat. Hist. (PC)
Lamouroux, J. V. F. (1779-1825)	Caen, France, Inst. Bot. (CN)
Le Jolis, A. F. (1823-?)	Brussels, Jard. Bot. (BR)
Lemoine, P.	Paris, Mus. Nat. Hist. (PC)
Lenormand, S. R. (1796-1871)	Caen, France. Inst. Bot. (CN); Paris, Mus. Nat. Hist. (PC)
Leprieur	Paris, Mus. Nat. Hist. (PC)
Léveillé, J. H. (1796-1870)	Paris, Mus. Nat. Hist. (PC)
Levring, T.	Göteborg, Sweden (private collection)
Lightfoot, J. (1735-1788)	Kew, Roy. Bot. Gard. (K)
Linnaeus, C. (1707-1778)	London, Linn. Soc. (LINN)
Lucas, A. H. S. (1853-1936)	Canberra, Div. of Pl. Ind. (CANB); (isotypes in Adelaide, Bot. Dep. Univ.) (ADU)
Lyngbye, H. C. (1762-1837)	Copenhagen, Bot. Mus. (C)
Martens, G. von (1788-18..)	Leningrad, Inst. Bot. (LE)
Mazé, H. P. (1818-1892)	Paris, Mus. Nat. Hist. (PC)
Melvill, J. C.	Shrewsbury, England, Meole Brace Hall
Meneghini, G. (1811-1889)	Florence, Italy, Herb. Univ. Fior. (FI); also few in herb. Kützing
Mertens, F. C.	Paris, Mus. Nat. Hist. (PC)
Montagne, J. F. C. (1784-1866)	Paris, Mus. Nat. Hist. (PC); also few in herb. Kützing
Moore, G. T.	St. Louis, Mo., U.S.A., Bot. Gard. (MO)
Murray, G. R. M. (1858-1911)	London, Brit. Mus. (BM)
Naegeli, C. W. von (1817-1891)	Munich, Bot. Staatssamml. (M); Zürich, Switzerland, Inst. Spez. Bot., E.T.H. (ZT); also few in herb. Kützing
Nordstedt, C. F. O. (1838-1924)	Lund, Sweden, Bot. Mus. and Herb. (LD)
Nott, C. P.	Berkeley, Calif., U.S.A., Dep. of Bot. (UC)
Okamura, K.	Tokyo, Imp. Fish. Inst.
Ostrup, E.	Copenhagen, Bot. Mus. (C) (*Diatomeae*)
Papenfuss, G. F. (1903-x)	Berkeley, Calif., U.S.A., Dep. of Bot. (UC)
Pelvet	Caen, France, Inst. Bot. (CN)
Peterfi, S.	Cluj, Romania, Inst. Bot. (CL)

Peterson, H. E.	Copenhagen, Bot. Mus. (C)
Piccone, A. (1844-1901)	Verona, Italy, Mus. Civ. Stor. Nat. (VER)
Pike, N.	London, Brit. Mus. (BM); New York, Bot. Gard. (NY)
Postels, A. & Ruprecht, F. J. (1814-1870)	Leningrad, U.S.S.R., Bot. Inst. (LE)
Printz, K.	Oslo, Bot. Mus. (O); Trondheim, Norway, Kon. Nor. Vid. Selsk. (TRH)
Raineri, R.	Turin, Italy, Ist. Bot. (TO) (fossil algae)
Ralfs, J.	London, Brit. Mus. (BM); also in herb. Griffith and herb. Hooker
Reinbold, Th.	Leiden, Netherlands, Rijksherb. (L) (*Sargassum, Cladophora*); Munich, Bot. Staatssamml. (M)
Reinke, J. (1849-1931)	Kiel, Germany, Bot. Inst.
Reinsch, P. F. (1836-1914)	Kew, Roy. Bot. Gard. (K)
Ringdal, K.	Oslo, Bot. Mus. (O)
Rosenvinge, L. Kolderup (1858-1939)	Copenhagen, Bot. Mus. (C)
Roth, A. W. (1757-1834)	Berlin-Dahlem (destroyed)
Ruprecht, F. J. (1814-1870)	Leningrad, U.S.S.R., Bot. Inst. (LE)
Sauvageau, C. (1861-1936)	Paris, Mus. Nat. Hist. (PC)
Schmidel, O. E.	Berlin-Dahlem (destroyed)
Schmidle, G. (1860-x)	Zürich, Switzerland, Inst. Spez. Bot., E.T.H. (ZT)
Schmidt, J. (1851-?)	Copenhagen, Bot. Mus. (C)
Schmitz, Fr. (1850-1895) und Hauptfleisch, P.	Leiden, Netherlands, Rijksherb. (L) (few)
Setchell, W. A. (1864-1943)	Berkeley, Calif., U.S.A., Dep. of Bot. (UC)
Sirodot, S. (1825-1903)	Roscoff, Stat. biol., France
Skottsberg, C. J. F. (1880-x)	Uppsala, Sweden, Inst. Syst. Bot. (UPS)
Smith, G. M. (1885-x)	Stanford, Calif., U.S.A., Nat. Hist. Mus. (DS)
Smith, H. L.	Antwerp, Belgium, Natuurwet. Mus. (AWH) (*Diatomeae*); Indianapolis, Indiana, U.S.A., Cristus Attucks Highschool (CAHS)
Smith, J. E. (1759-1828)	London, Linn. Soc. (LINN)
Smith, W.	Antwerp, Belgium, Natuurwet. Mus. (AWH) (*Diatomeae*)
Solander, D. C. (1736-1782)	Kew, Roy. Coll. of Surgeons
Sonder, O. W. (1812-1881)	Kew, Roy. Bot. Gard. (K) (few); Melbourne, Nat. Herb. (MEL); Stockholm, Naturhist. Riksmus. (S); also few in herb. Kützing
Sowerby, J. (1757-1822)	London, Brit. Mus. (BM)
Stackhouse, J. (1742-1819)	London, Brit. Mus. (BM), Linn. Soc. (LINN); also in herb. Hooker
Suhr, J. N. (1792-1847)	Lund, Sweden, Bot. Mus. and Herb. (LD); also few in herb. Kützing and in herb. Agardh
Suringar, W. F. R. (1832-1898)	Leiden, Netherlands, Rijksherb. (L)
Svedelius, N. E. (1873-x)	Uppsala, Sweden, Inst. Syst. Bot. (UPS)
Taylor, W. R. (1895-x)	Ann Arbor, Mich., U.S.A., Herb. Univ. (MICH)
Tempère, J. and H. Peragallo	Antwerp, Belgium, Natuurwet. Mus. (AWH) (*Diatomeae*)
Thuret, G. A. (1817-1875)	Paris, Mus. Nat. Hist. (PC)
Tiffany, L. H. (1894-x)	Evanston, Ill., U.S.A., private collection
Tilden, J. E.	Hesperides, Lake Wales, Florida, U.S.A. (private collection)
Transeau, E. M. (1875-x)	Columbus, Ohio, U.S.A., Dep. of Bot. (OS)

Turner, D. (1775-1858)	London, Brit. Mus. (BM) (few); Kew, Roy. Bot. Gard. (K)
Tyson, W. (1851-1920)	Capetown, S. Afr., Bolus Herb. (BOL)
Velley, T. (1748-1806)	Liverpool, England, City Mus. (LIV); also in herb. Hooker and herb. Goodenough
Wahlstedt, L. J. (1836-1917)	Chicago, Nat. Hist. Mus. (F)
Weber-Van Bosse, A. A. (1852-1942)	Leiden, Netherlands, Rijksherb. (L); Copenhagen, Bot. Mus. (C) (some)
West, W. (1848-1914)	Birmingham, England, Dep. of Bot. (BIRM) (*Desmidiaceae*)
Wildeman, E. A. J. de (1866-1947)	Brussels, Bot. Gard. (BR); also few in herb. Weber-van Bosse
Wille, J. N. F. (1858-?)	Oslo, Bot. Mus. (O)
Wittrock, V. B. (1839-1914)	Uppsala, Sweden, Inst. Syst. Bot. (UPS)
Wolle, F. (1817-1893)	Chicago, Nat. Hist. Mus. (F)
Womersley, H. B. S. (1922-x)	Adelaide, Australia, Bot. Dep. (ADU)
Yamada, Y.	Sapporo, Japan, Bot. Inst. (SAP)
Yendo, K.	Sapporo, Japan, Bot. Inst. (SAP)
Zanardini, G. A. M. (1804-1878)	Venice, Italy, Mus. Civ. Correr; also few in herb. Kützing
Zaneveld, J. S.	Bogor, Java, Herb. Bogor. (BO); Leiden, Netherlands, Rijksherb. (L)

This list, which is open to corrections and additions, has been compiled from various sources, including information given by Dr. F. Drouet, Dr. G. F. Papenfuss and Dr. H. B. S. Womersley, and from the lists of C. Dickinson and L. Newton in Bull. Brit. Phyc. Soc. 1. 1952. It is mainly based on a list published in Bull. Brit. Phyc. Soc. 2. 1954.

PALÉOBOTANISTES DU MONDE II

Edouard Boureau (Paris)

Il est fait appel à tous les Paléobotanistes du Monde dont les travaux ont figuré dans le Premier Rapport Mondial (*Regnum vegetabile* 7: 1-101, 1956) et dont l'adresse n'a pas été relevée dans le présent périodique (*Taxon* 5: 168-180, 1956) de faire connaître cette dernière au Secrétariat de l'I.O.P., *61 rue Buffon, Paris — 5°. France.* On trouvera ci-après un complément à la première liste:

Bertsch, Karl — Meersburgerstrasse 97, *Ravensburg,* Germany.

Chang, L. C. — Institute of Palaeontology, Academia Sinica, 1 Chi-Ming-Sze, *Nanking,* China.

Chang, S. J. — Institute of Palaeontology, Academia Sinica, 1 Chi-Ming-Sze, *Nanking,* China.

Chow, T. Y. — Institute of Palaeontology, Academia Sinica, 1 Chi-Ming-Sze, *Nanking,* China.

Cranwell-Smith, Lucy — 5045 East Grant Road, Route 4, Box 449, *Tucson,* Arizona, U.S.A.

Dettmann, Mary E. — Botany Department, University of Melbourne, *Carlton 3,* Victoria, Australia.

Dwivedi, J. N. — Government College of Science, *Nagpur,* India.

Dybova, Sona — Geolog H.S.V.P., Ministervo paliv a energetiky, 1 Omladinaru, *Praha II,* Czechoslovakia.

Faegri, K. — Botanisk Museum, *Bergen,* Norway.

Ghosh, S. S. — Forest Research Institute, *Dehra Dun,* India.

Gupta, K. M. — Botany Department, Jaswant College, *Jodhpur,* India.

Iversen, J. — Danmarks Geologiska Undersogelse, *Charlottenlund,* Denmark.

Kolbe, Rob. W. — Paleobotaniska Avd., Naturhistoriska Riksmuseum, *Stockholm 50,* Sweden.

Kufferath, H. — 20, Rue Joseph II, *Bruxelles 4e,* Belgium.

Lee, H. H. — Institute of Palaeontology, Academia Sinica, 1 Chi-Ming-Sze, *Nanking,* China.

Lona, Fausto — Instituto Botanico dell' Università, *Parma,* Italy.

Mädler, Karl — Wiesenstrasse 1, *Hannover (20a),* Germany.

Manum, Svein — Universetet, *Blindern-Oslo,* Norway.

Mehta, K. R. — 30, Park Road, *Allahabad,* India.

Navale, G. K. B. — Birbal Sahni Institute of Palaeobotany, University Road, *Lucknow,* India.

Peck, Raymond E. — Geology Department, University of Missouri, 101 Swallow Hall, *Columbia,* Mo., U.S.A.

Puri, G. S. — Botanical Survey of India, *Poona,* India.

Rásky, Klara — Lovas ut 23, *Budapest I,* Hungary.

Sahni, Savitri — Birbal Sahni Institute of Palaeobotany, University Road, *Lucknow,* India.

Schultze-Motel, Juergen — Institut für Kulturpflanzenforschung, *Gatersleben,* Kreis Aschersleben, Germany.

Sheng, J. C. — Institute of Palaeontology, Academia Sinica, 1 Chi-Ming-Sze, *Nanking,* China.

Shukla, B. N. — Geological Survey of India, Wala Gadar Road, *Lucknow,* India.

Sprumont, G. — 48 Chaussée de Bruxelles, *Ath,* Belgium.

Tokunaga, Shigemoto — Geological Survey of Japan, Coal Section, Tokyo Branch, 8 Kawadacho, Shinjukuku, *Tokyo-to,* Japan.

Trotter, C. L. — 108 Mineral Science Building, Pennsylvania State College, *State College,* Pa., U.S.A.

Varma, C. P. — Oil and Gas Directorate, Ministry of Natural Resources and Scientific Research, *Dehra Dun,* India.

Varma, J. K. — Government College of Science, *Nagpur,* India.

Wang, S. — Institute of Palaeontology, Academia Sinica, 1 Chi-Ming-Sze, *Nanking,* China.

Winslow, M. — Coal geology Laboratory, Orton Hall, Ohio State University, *Columbus 10,* Ohio, U.S.A.

NEWS AND NOTES

BRYOLOGISTS: ATTENTION!

The Committee for Bryophytes of the International Botanical Congress requests that all bryologists who are concerned about the starting point date for the nomenclature of Musci express to the Chairman of this Committee their satisfaction or dissatisfaction with the present rule, which declares Hedwig's *Species Muscorum* to have been published on the conventional date 31 December 1801. Discussion of the problem has been published in *Taxon* (issues of September 1956 and January-February 1957). Briefly, the possible dates for *Species Muscorum* are:

(1) 31 December 1801, the date established in the International Code of 1950. Under this rule no other books of 1801 are accepted for nomenclatorial purposes.

(2) 1 January 1801. Under this proposed change seven volumes on mosses published in 1801, with some 200 species names not in Hedwig, would become available. The chief authors of these names are Bridel, Dickson, Swartz and Withering.

(3) 19 April 1801, the actual date of the publication of *Species Muscorum.* Under this proposed change volumes actually published subsequent to the *Species Muscorum,* including the authors above, would be accepted. Evidence for the sequence of publication in 1801 has appeared in *Taxon* for January-February 1957.

The Committee for Bryophytes will vote upon these possibilities. It is urgently requested that the bryologists of the world assist the Committee by sending their opinions *before 1 July* 1957 to the undersigned, Chairman of the Committee (Botanical Laboratory, Grote Rozenstraat 31, Groningen, Netherlands).

R. VAN DER WIJK

SIR WILLIAM WRIGHT SMITH (1875-1956)

The distinguished botanical and horticultural career of Sir William Wright Smith, F.R.S., F.R.S.E., D.ès.Sc., Ll.D., F.L.S., V.M.H., Queen's Botanist in Scotland, Regius Keeper of the Royal Botanic Garden, Edinburgh, and Regius Professor of Botany in the University of Edinburgh, covered more than half a century.

He was born at Lochmaben in Dumfriesshire on February 2nd, 1875, and received his early education at Dumfries Academy. At the age of 16 he entered the University of Edinburgh and pursued the Arts curriculum, graduating in 1896. For a time he taught under the Edinburgh School Board before joining the Staff of Professor Sir Isaac

Bayley Balfour in the Botany Department of the University in 1902. Apart from a break of four years spent in India (1907-11), his long academic career was spent in this Department.

In India he was appointed to the charge of the Government Herbarium in the Royal Botanic Garden, Calcutta. Twice he was Acting Superintendent of the Calcutta Garden and thus gained firsthand acquaintance with the administration of a large scientific garden. Of equal importance was the opportunity he took of exploration into little known regions of the Himalaya, especially the hitherto untraversed alpine regions of Llonakh on the Tibetan frontier, at altitudes of 14,000 ft., and the high alpine regions between the Tibetan valley of Chumbi and Eastern Sikkim.

He returned to Edinburgh in 1911 as Deputy Keeper of the Garden, and Balfour and he straightway immersed themselves in the collections of Forrest from Western China. At first he described numerous new species of many genera (over 550 new species between 1911 and 1922), but when Balfour died he concentrated on unravelling the intricacies of the two great genera *Rhododendron* and *Primula* — especially the latter. His most important publications are the long series of papers on the sections of the genus *Primula,* which were published in the Transactions of the Royal Society of Edinburgh and the Transactions of the Botanical Society of Edinburgh.

His great contributions to botany and horticulture were widely recognised; knighthood in 1932; Fellowship of the Royal Society in 1945; the MacDougall-Brisbane Prize from the Royal Society of Edinburgh, of which he was President from 1944-49; the Victoria Medal of Honour in 1925 and the Veitch Memorial Medal in 1930, both from the Royal Horticultural Society of which, for many years, he was a Vice-President and its Honorary Professor of Botany. He was also an Honorary Member of the American Academy of Arts and Sciences; D.ès.Sc. of the University of Toulouse, and Ll.D. of the University of Aberdeen.

He died on December 15th, 1956 and Lady Smith and three daughters survive him.

H. R. Fletcher

JOHAN HAVAAS (1864-1956)

The death is announced of Johan Havaas of Granvin, Norway. Johan Havaas died on April 27, 1956; he was a well known authority on scandinavian lichens, and apart from his short publications in this field he was most conspicuous as the exemplary collector and editor of the *Lichenes norvegiae occidentalis exsiccatae* and the *Lichenes norvegiae exsiccatae.* His main collections are to be found at the Bergen Botanical Museum.

TOMITARO MAKINO (1861-1957)

The death is announced of Dr. Tomitaro Makino, the well-known Japanese botanist. Dr. Makino died on January, 18th, 1957; in a large number of botanical publications (see E. G. Merrill and Walker, Bibliography of Eastern Asiatic Botany pp. 289-297, sic!) he laid the foundation for to-day's knowledge of the Japanese Flora.

DRUCKFEHLER IM CODE

In der deutschen Fassung des Internationalen Code der Botanischen Nomenklatur, Utrecht 1956, ist im Artikel 75 (p. 143) eine Zeile doppelt gedruckt worden und dafür eine andere ausgelassen worden. Es handelt sich um ein drucktechnisches Versehen, das bedauerlicherweise erst nach der letzten Korrektur in der Druckerei entstanden ist. Die 1. Zeile des 5. Absatzes (Kleindruck) ist durch folgenden Wortlaut zu ersetzen:

„Beispiele für Epitheta, die als orthographische Varianten angesehen werden: *chinensis*....".

Alle Benutzer des Code werden gebeten, in ihren Exemplaren die genannte Korrektur vorzunehmen.

UNIV. OF OKLAHOMA BIOL. STA.

The University of Oklahoma announces that a grant from the National Science Foundation has provided funds for a number of grants-in-aid to be awarded to competent students and investigators in biology for the 1957 summer session at the University of Oklahoma Biological Station, Lake Texoma. Three types of grants are available: (1) postdoctoral grants of $ 500; (2) predoctoral grants of $ 350; (3) $ 200 grants to superior undergraduates or beginning graduates. The investigations pursued must be suitable for the Biological Station.

Applications for grants-in-aid should be made by April 10, and should be sent to: Carl D. Riggs, Director, University of Oklahoma Biological Station, Norman, Oklahoma.

NEW BOOKS ON POLLEN ANALYSIS

Masa Ikuse, Pollen Grains of Japan, Hirohawa Publishing Co. Tokyo, 1956, 303 pp., 76 plates.

E. M. van Zinderen Bakker, South African Pollen Grains and Spores, Part II, Amsterdam/Cape Town, 1956, 72 pp., 16 plates.

Miss Ikuse's book starts with a list of important literature, comprising 24 titles of which 15 deal with japanese palynology. A list of abbreviations and a glossary follow, both in japanese, the latter showing that the author is using Erdtman's terminology. The text is for the greater part in japanese. The table in which the types, patterns and sizes of the different species are given (p. 35-152) and the "table showing pollen types of families" (p. 155-170) are, as is proved by the use of abbreviations of pollen types drawn up according to Erdtman's system, and by the use of numbered types, also quite understandable for those who are not familiar with this language. After these parts the author gives a "key to families and genera by pollen type" (p. 171-198) and a "key to the families or genera by pollen size" (p. 199-249), both in English. Those who are interested in aeropalynology will be pleased to find a "floral calender" (p. 251-275), apparently indicating the months of flowering of the more important species. Plates 1-40 contain drawings of pollen grains of 348 species, arranged in taxonomic order; the drawings are somewhat schematic but in general they are workable and well drawn. Plate 41-76 contain photographs of pollen grains of another 236 species arranged according the pollen type. The photographs are good. Details, also those on magnification and photographic technics are given, in English, on a separate sheet; they give the impression of having been added later on, which, in the present reporter's opinion, is regrettable. The figures of both series of plates are listed in the general index. The plates together with the tables and keys will enable us to identify a great part of the pollen grains of japanese plants, as well as the pollen grains found in peat and lignite deposits. It will also be helpful in analysing peat and lignite samples from Europe and America, as the tertiary floras of these regions contain a considerable percentage of japanese genera, and this applies to the sino-american pleistocene floras too. At the end of the book not only an index of family and genus names (p. 279-286), but also an index of japanese names (p. 287-303) is given. The author added a valuable book to the rather few atlasses of extra-european countries and is to be congratulated on the result of her work.

Part I of Dr van Zinderen Bakker's series was revised in Taxon II (1953), p. 180. Part II deals with some orders of *Choripetalae*, viz. the families of *Polygonales, Caryophyllales, Ranunculales, Podostemales*, some families of *Rosales* and the family *Droseraceae*. The plates contain altogether 80 drawings. The figured pollen grains are described in 43 pages text, as in the first part followed by an bibliography and a glossary. In the latter now not only the terminology from Erdtman, Wodehouse and Selling are explained but also that of Iversen and Troëls-Smith, the absence of which was signalized by the present reporter in his review of part I.

F. P. Jonker

NOTICES OF BOOKS

Contributions to this column will be gratefully received by Mr. K. U. Kramer, Botanical Museum, Lange Nieuwstraat 106, Utrecht, Netherlands.

Flora of Nevada

D. B. Dunn: Contributions toward a flora of Nevada 39. *Leguminosae*, Part II — *Lupinus*. 64 pp. Beltsville, Md., 1956.

C. F. Reed: Id. 41. *Chenopodiaceae*. 96 pp., 36 maps. Ibid., 1956.

Flora of Paraná

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NOMINA CONSERVANDA PROPOSITA

(23) Proposal for the conservation of the generic name **Heteropyxis** Harvey (1863) of the *Heteropyxidaceae* versus *Heteropyxis* Griffith (1854) of the *Bombacaceae.*

Heteropyxis Harvey, Thes. Cap. 2: 18. *t. 128* (1863) nom. cons. prop. *Adopted by*: Hook. f. in Benth. et Hook. f. Gen. Pl. 1: 785 (1867), et in Harvey, Gen. S. Afr. Pl. ed. 2. 116 (1868); Oliv. in Hook. Ic. Pl. 25: *t. 2407* (1895); Engler in Engler et Prantl, Nat. Pflanzenfam. Nachtr. (zum 2-4), 335 (1897); Wood, Trans. S. Afr. Phil. Soc. 18: 157 (1908);

Hutch. Fam. Fl. Pl. Dicot. 246 (1926); Burtt Davy, Man. Fl. Pl. and Ferns Transv. 1(2): 467 (1932); Phillips, Gen. S. Afr. Fl. Pl. ed. 2. 492 (1951).

Holotype-species: *H. natalensis* Harvey, *loc. cit.*

Heteropyxis Griffith, Notul. Pl. As. 4: 524. *t. 594* (1854); auctt. in syn.

Holotype-species: *Boschia griffithii* Masters in Hook. f. Fl. Brit. India, 1: 352 (1874).

Discussion. It is evident that the Asiatic genus *Heteropyxis* Griffith has never been maintained as a distinct genus; there has never been a published binomial under it. Griffith's text and plates were published posthumously and it was at once realized that his *Heteropyxis* was congeneric with *Boschia* Korthals (1844). Harvey's use of the name, illegitimate under the modern Code, was quite in accordance with the practice then current and his *Heteropyxis* has been used exclusively for the African taxon concerned. It also provides the stem for the family name *Heteropyxidaceae* and for this reason alone it would be inconvenient if a new name had to be provided. Although only two binomials are involved, the genus has a wide distribution in south-eastern Africa and is very well known ecologically.

Proposed by: A. A. Bullock (Kew).

(24) Proposal for the conservation of the generic name **Gueldenstaedtia** Fisch. (Leguminosae, subf. Papilionoideae) versus *Gueldenstaedtia* Necker.

Gueldenstaedtia Fischer, Mem. Soc. Nat. Moscou 6: 170. 1823: nom. cons. prop. *Adopted by*: de Candolle, Prodr. 2: 307. 1825; Benth. et Hooker f. Gen. Plant. 1(2): 506. 1865; Engler et Prantl, Nat. Pflanzenfam. 3(3): 284. 1894; Dalla Torre et Harms, Gen. Siphonogam.: 234. 1900-1907; Hooker f. Fl. Brit. Ind. 2: 117. 1876; Forbes et Hemsley, Enum. Plant. Chin. & c. (Ind. Fl. Sin.), Journ. Linn. Soc. (Bot.) 23: 164. 1887; Kruilov, P., Fl. Altaya & c.,: 235. 1903; Jacot, the Genus *Gueldenstaedtia*, (monograph), J. N. China Br. Asiat. Soc. 58: 85-125. 1927; Handel-Mazzetti, Symb. Sinic. 7: 553. 1933; Borissona in Komarov, Fl. U.R.S.S. 11: 384. 1945; Komarov, Fl. Manch. 4: 581. 1950. *Number of Species*: About twelve.

Proposed Lectotype: *G. pauciflora* (Pall.) Fischer, [which is a synonym of *G. verna* (Georgi) Boriss.] Fischer based the genus on two species i.e. *G. monophylla* Fischer and *G. pauciflora* (Pall.) Fischer. *G. pauciflora* (Pall.) Fischer has preference over *G. monophylla* Fischer, because the latter is the only species of the genus with unifoliolate leaf.

Distribution: Mainly east Asian in distribution, from Sibaria to Himalayas.

Gueldenstaedtia Necker, Elem. 2: 204. 1790 (Chenopodiaceae): nom. gen. rej. prop. *Adopted by*: No author traced.

Type-species: Necker indicated no type and from the description it is not easy to come to any conclusion. It is taken to be a synonym of *Eurotia* Adans.

Discussion: Kitagawa [in Rep. First Sc. Exped. Manch. sect. 4(4): 87. 1936 (Index Fl. Jehol.)] proposed *Ambly(o)tropis* *) Kitagawa, a new generic name for this genus, on account of the earlier homonym of Necker. This new generic name has not been adopted by subsequent workers. It can be argued that as the names of Necker's *species naturales* are not equivalent to generic names, as stated by T. A. Sprague, (Synopsis of Prop. submitted Sixth Int. Sc. Cong. Amst. 1935, p. 79) there is no need to conserve *Gueldenstaedtia* Fischer. However the nomenclatural standing of Necker's *species naturales* is not clear [Stafleu, F. A., Taxon 5(5): 92. 1956] and the fact that in the present list of 'Nomina Generica Conservanda et Rejicienda' 63 of Necker's names occur (7 as conserved generic names and 56 as rejected names), definitely calls for a ruling on this matter, so as to maintain uniformity of treatment and to avoid confusion of nomenclature.

In the present case the conservation of *Gueldenstaedtia* Fischer, the generic name almost universally adopted, will automatically reduce to synonymy *Amblyotropis* Kitagawa, the adoption of which otherwise will appear reasonable to those taxonomists at least who think that Necker's *species naturales* should be accepted as equivalent to normally published genera.

Proposed by: S. I. Ali (Pakistan).

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*) Kitagawa originally published it as *Amblytropis*, but it was subsequently corrected to *Amblyotropis* in Index Kewensis, suppl. 10. 1947.

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